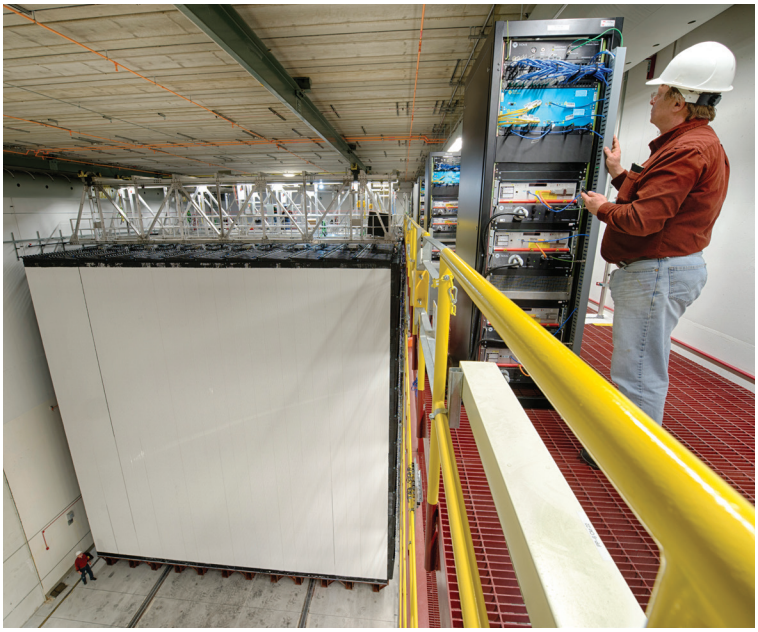
The NOvA Neutrino Experiment

Fermilab's latest project will help scientists determine the role that particles known as neutrinos played in the evolution of the universe.

Mysterious neutrinos

Neutrinos are among the most abundant particles in the universe, a billion times more abundant than the particles that make up stars, planets and people. Each second, a trillion neutrinos from the sun and other celestial objects pass through your body.

Although neutrinos are all around us, they interact so rarely with other particles that they are very difficult to detect. That is why researchers use particle accelerators to create intense beams with lots of neutrinos and build very large particle detectors—the size of a house and larger—that can spot neutrinos when they interact with other matter.



The first modules of the NOvA far detector, about 50 feet high and 50 feet wide, started recording particle tracks in March 2013. The detector, located in a new laboratory in northern Minnesota, is now looking for neutrinos coming from the Department of Energy's Fermilab. When complete in 2014, the NOvA detector will be 200 feet long, about twice the length of a basketball court.

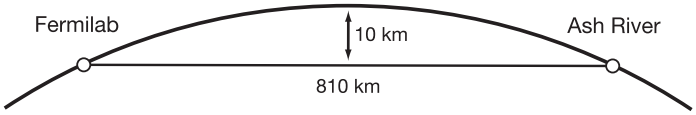
The NOvA detectors

The NOvA experiment consists of a 300-ton particle detector at Fermilab (near detector) and a 14,000-ton detector in northern Minnesota (far detector). The near detector is being installed in a cavern 350 feet underground, connected to an existing underground hall on the Fermilab site. The far detector is under construction in a brand-new building near Ash River, Minnesota. The first modules of the far detector started recording particle tracks in March 2013, and the entire far detector will be complete and operational in the summer of 2014.

The world's best neutrino beam

Fermilab's accelerator complex produces the most intense neutrino beam in the world and sends it from Fermilab straight through the earth to northern Minnesota—no tunnel necessary. Moving at close to the speed of light, the neutrinos travel the 500-mile distance in less than three milliseconds.

The NOvA collaboration is constructing a neutrino detector in a new laboratory in Ash River, Minnesota. The scientists will use Fermilab's neutrino beam to explore the strange properties of neutrinos, especially the elusive transition of muon neutrinos into electron neutrinos. The experiment will help answer some of the most important scientific questions about neutrino masses, neutrino oscillations and the role neutrinos may have played in the evolution of the universe.



For more information

NOvA website:
www-nova.fnal.gov

NOvA video:
www.youtube.com/watch?v=Fe4veClYxkE

Webcam at the NOvA construction site in Minnesota:
www.fnal.gov/pub/webcams/nova_webcam/